Linear Transformations Math Tamu Texas A M

The sparse backslash book. Everything you wanted to know but never dared to ask about modern direct linear solvers. Chen Greif, Assistant Professor, Department of Computer Science, University of British Columbia.Overall, the book is magnificent. It fills a long-felt need for an accessible textbook on modern sparse direct methods. Its choice of scope is excellent John Gilbert, Professor, Department of Computer Science, University of California, Santa Barbara.Computational scientists often encounter problems requiring the solution of sparse systems of linear equations. Attacking these problems efficiently requires an in-depth knowledge of the underlying theory, algorithms, and data structures found in sparse matrix software libraries. Here, Davis presents the fundamentals of sparse matrix algorithms to provide the requisite background. The book includes CSparse, a concise downloadable sparse matrix package that illustrates the algorithms and theorems presented in the book and equips readers with the tools necessary to understand larger and more complex software packages.With a strong emphasis on MATLAB and the C programming language, Direct Methods for Sparse Linear Systems equips readers with the working knowledge required to use sparse solver packages and write code to interface applications to those packages. The book also explains how MATLAB performs its sparse matrix computations.Audience This invaluable book is essential to computational scientists and software developers who want to understand the theory and algorithms behind modern techniques used to solve large sparse linear systems. The book also serves as an excellent practical resource for students with an interest in combinatorial scientific computing.Preface; Chapter 1: Introduction; Chapter 2: Basic algorithms; Chapter 3: Solving triangular systems; Chapter 4: Cholesky factorization; Chapter 5: Orthogonal methods; Chapter 6: LU factorization; Chapter 7: Fill-reducing orderings; Chapter 8: Solving sparse linear systems; Chapter 9: CSparse; Chapter 10: Sparse matrices in MATLAB; Appendix: Basics of the C programming language; Bibliography; Index.
Table of contents
This textbook develops the essential tools of linear algebra, with the goal of imparting technique alongside contextual understanding. Applications go hand-in-hand with theory, each reinforcing and explaining the other. This approach encourages students to develop not only the technical proficiency needed to go on to further study, but an appreciation for when, why, and how the tools of linear algebra can be used across modern applied mathematics. Providing an extensive treatment of essential topics such as Gaussian elimination, inner products and norms, and eigenvalues and singular values, this text can be used for an in-depth first course, or an application-driven second course in linear algebra. In this second edition, applications have been updated and expanded to include numerical methods, dynamical systems, data analysis, and signal processing, while the pedagogical flow of the core material has been improved. Throughout, the text emphasizes the conceptual connections between each application and the underlying linear algebraic techniques, thereby enabling students not only to learn how to apply the mathematical tools in routine contexts, but also to understand what is required to adapt to unusual or emerging problems. No previous knowledge of linear algebra is needed to approach this text, with single-variable calculus as the only formal prerequisite. However, the reader will need to draw upon some mathematical maturity to engage in the increasing abstraction inherent to the subject. Once equipped with the main tools and concepts from this book, students will be prepared for further study in differential equations, numerical analysis, data science and statistics, and a broad range of applications. The first author’s text, Introduction to Partial Differential Equations, is an ideal companion volume, forming a natural extension of the linear mathematical methods developed here.
This volume contains the proceedings of the AMS Special Session on Harmonic Analysis of Frames, Wavelets, and Tilings, held April 13-14, 2013, in Boulder, Colorado. Frames were first introduced by Duffin and Schaeffer in 1952 in the context of nonharmonic Fourier series but have enjoyed widespread interest in recent years, particularly as a unifying concept. Indeed, mathematicians with backgrounds as diverse as classical and modern harmonic analysis, Banach space theory, operator algebras, and complex analysis have recently worked in frame theory. Frame theory appears in the context of wavelets, spectra and tilings, sampling theory, and more. The papers in this volume touch on a wide variety of topics, including: convex geometry, direct integral decompositions, Beurling density, operator-valued measures, and splines. These varied topics arise naturally in the study of frames in finite and infinite dimensions. In nearly all of the papers, techniques from operator theory serve as crucial tools to solving problems in frame theory. This volume will be of interest not only to researchers in frame theory but also to those in approximation theory, representation theory, functional analysis, and harmonic analysis.
Tensors are ubiquitous in the sciences. The geometry of tensors is both a powerful tool for extracting information from data sets, and a beautiful subject in its own right. This book has three intended uses: a classroom textbook, a reference work for researchers in the sciences, and an account of classical and modern results in (aspects of) the theory that will be of interest to researchers in geometry. For classroom use, there is a modern introduction to multilinear algebra and to the geometry and representation theory needed to study tensors, including a large number of exercises. For researchers in the sciences, there is information on tensors in table format for easy reference and a summary of the state of the art in elementary language. This is the first book containing many classical results regarding tensors. Particular applications treated in the book include the complexity of matrix multiplication, P versus NP, signal processing, phylogenetics, and algebraic statistics. For geometers, there is material on secant varieties, G-varieties, spaces with finitely many orbits and how these objects arise in applications, discussions of numerous open questions in geometry arising in applications, and expositions of advanced topics such as the proof of the Alexander-Hirschowitz theorem and of the Weyman-Kempf method for computing syzygies.
This book is devoted to some topical problems and applications of operator theory and its interplay with modern complex analysis. It consists of 20 selected survey papers that represent updated (mainly plenary) addresses to the IWOTA 2000 conference held at Bordeaux from June 13 to 16, 2000. The main subjects of the volume include: - spectral analysis of periodic differential operators and delay equations, stabilizing controllers, Fourier multipliers; - multivariable operator theory, model theory, commutant lifting theorems, coisometric realizations; - Hankel operators and forms; - operator algebras; - the Bellman function approach in singular integrals and harmonic analysis, singular integral operators and integral representations; - approximation in holomorphic spaces. These subjects are unified by the common "operator theoretic approach" and the systematic use of modern function theory techniques.
TensorsGeometry and ApplicationsAmerican Mathematical Soc.
This book is a collection of articles written in memory of Boris Dubrovin (1950–2019). The authors express their admiration for his remarkable personality and for the contributions he made to mathematical physics. For many of the authors, Dubrovin was a friend, colleague, inspiring mentor, and teacher. The contributions to this collection of papers are split into two parts: “Integrable Systems” and “Quantum Theories and Algebraic Geometry”, reflecting the areas of main scientific interests of Dubrovin. Chronologically, these interests may be divided into several parts: integrable systems, integrable systems of hydrodynamic type, WDVV equations (Frobenius manifolds), isomonodromy equations (flat connections), and quantum cohomology. The articles included in the first part are more or less directly devoted to these areas (primarily with the first three listed above). The second part contains articles on quantum theories and algebraic geometry and is less directly connected with Dubrovin's early interests.
Principles of Applied Mathematics provides a comprehensive look at how classical methods are used in many fields and contexts. Updated to reflect developments of the last twenty years, it shows how two areas of classical applied mathematics spectral theory of operators and asymptotic analysis are useful for solving a wide range of applied science problems. Topics such as asymptotic expansions, inverse scattering theory, and perturbation methods are combined in a

unified way with classical theory of linear operators. Several new topics, including wavelength analysis, multigrid methods, and homogenization theory, are blended into this mix to amplify this theme.This book is ideal as a survey course for graduate students in applied mathematics and theoretically oriented engineering and science students. This most recent edition, for the first time, now includes extensive corrections collated and collected by the author.

A co-publication of the AMS and Centre de Recherches Mathématiques The book is a collection of lecture notes and survey papers based on the mini-courses given by leading experts at the 2015 Séminaire de Mathématiques Supérieures on Geometric and Computational Spectral Theory, held from June 15–26, 2015, at the Centre de Recherches Mathématiques, Université de Montréal, Montréal, Quebec, Canada. The volume covers a broad variety of topics in spectral theory, highlighting its connections to differential geometry, mathematical physics and numerical analysis, bringing together the theoretical and computational approaches to spectral theory, and emphasizing the interplay between the two.

This volume comprises a collection of papers presented at the Workshop on Information Protection, held in Moscow, Russia in December 1993. The 16 thoroughly refereed papers by internationally known scientists selected for this volume offer an exciting perspective on error control coding, cryptology, and speech compression. In the former Soviet Union, research related to information protection was often shielded from the international scientific community. Therefore, the results presented by Russian researchers and engineers at this first international workshop on this topic are of particular interest; their work defines the cutting edge of research in many areas of error control, cryptology, and speech recognition.

Drawing on an impressive roster of experts in the field, Fundamentals of Computer Graphics, Fourth Edition offers an ideal resource for computer course curricula as well as a user-friendly personal or professional reference. Focusing on geometric intuition, the book gives the necessary information for understanding how images get onto the screen by using the complementary approaches of ray tracing and rasterization. It covers topics common to an introductory course, such as sampling theory, texture mapping, spatial data structure, and splines. It also includes a number of contributed chapters from authors known for their expertise and clear way of explaining concepts. Highlights of the Fourth Edition Include: Updated coverage of existing topics Major updates and improvements to several chapters, including texture mapping, graphics hardware, signal processing, and data structures A text now printed entirely in four-color to enhance illustrative figures of concepts The fourth edition of Fundamentals of Computer Graphics continues to provide an outstanding and comprehensive introduction to basic computer graphic technology and theory. It retains an informal and intuitive style while improving precision, consistency, and completeness of material, allowing aspiring and experienced graphics programmers to better understand and apply foundational principles to the development of efficient code in creating film, game, or web designs. Key Features Provides a thorough treatment of basic and advanced topics in current graphics algorithms Explains core principles intuitively, with numerous examples and pseudo-code Gives updated coverage of the graphics pipeline, signal processing, texture mapping, graphics hardware, reflection models, and curves and surfaces Uses color images to give more illustrative power to concepts

This book is a comprehensive survey of the mathematical concepts and principles of industrial mathematics. Its purpose is to provide students and professionals with an understanding of the fundamental mathematical principles used in Industrial Mathematics/OR in modeling problems and application solutions. All the concepts presented in each chapter have undergone the learning scrutiny of the author and his students. The illustrative material throughout the book was refined for student comprehension as the manuscript developed through its iterations, and the chapter exercises are refined from the previous year's exercises.

The Conference “Perspectives in Analysis” was held during May 26–28, 2003 at the Royal Institute of Technology in Stockholm, Sweden. The purpose of the conference was to consider the future of analysis along with its relations to other areas of mathematics and physics, and to celebrate the seventy-?fth birthday of Lennart Carleson. The scienti?c theme was one with which the name of Lennart Carleson has been associated for over ?fty years. His modus operandi has long been to carry out a twofold approach to the selection of research problems. First one should look for promising new areas of ana- sis, especially those having close contact with physically oriented problems of geometric character. The second step is to select a core set of problems that require new techniques for their resolutions. After making a central contri- tion, Lennart would usually move on to a new area, though he might return to the topic of his previous work if new techniques were developed that could break old mathematical log jams. Lennart’s operating approach is based on fundamental realities of modern mathematics as well as his own inner c- victions. Here we ?rst refer to an empirical fact of mathematical research: All topics have a ?nite half-life, with ?fteen years being an upper bound for most areas. After that time it is usually a good idea to move on to so- thing new.

Solution Techniques for Elementary Partial Differential Equations, Third Edition remains a top choice for a standard, undergraduate-level course on partial differential equations (PDEs). Making the text even more user-friendly, this third edition covers important and widely used methods for solving PDEs. New to the Third Edition New sections on the series expansion of more general functions, other problems of general second-order linear equations, vibrating string with other types of boundary conditions, and equilibrium temperature in an infinite strip Reorganized sections that make it easier for students and professors to navigate the contents Rearranged exercises that are now at the end of each section/subsection instead of at the end of the chapter New and improved exercises and worked examples A brief Mathematica® program for nearly all of the worked examples, showing students how to verify results by computer This bestselling, highly praised textbook uses a streamlined, direct approach to develop students’ competence in solving PDEs. It offers concise, easily understood explanations and worked examples that allow students to see the techniques in action.

College Algebra provides a comprehensive exploration of algebraic principles and meets scope and sequence requirements for a typical introductory algebra course. The modular approach and richness of content ensure that the book meets the needs of a variety of courses. The text and images in this textbook are grayscale.

"This text covers a standard first course : Gauss's method, vector spaces, linear maps and matrices, determinants, and eigenvalues and eigenvectors. In addition, each chapter ends with some topics such as brief applications. What sets it apart is careful motivation, many examples, and extensive exercise sets. Together these help each student master the material of this course, and also help an instructor develop that student's level of mathematical maturity. This book has been available online for many years and is widely used, both in classrooms and for self-study. It is supported by worked answers for all exercises, beamer slides for classroom use, and a lab manual of computer work"--Page 4 of cover.

A compilation of 380 of SIAM Review's most interesting problems dating back to the journal's inception in 1959.

This book is the first systematic treatment of Bayesian nonparametric methods and the theory behind them. It will also appeal to statisticians in general. The book is primarily aimed at graduate students and can be used as the text for a graduate course in Bayesian non-parametrics.

A comprehensive, self-contained treatment of Fourier analysis and wavelets—now in a new edition Through expansive coverage and easy-to-follow explanations, A First Course in Wavelets with Fourier Analysis, Second Edition provides a self-contained mathematical treatment of Fourier analysis and wavelets, while uniquely presenting signal analysis applications and problems. Essential and fundamental ideas are presented in an effort to make the book accessible to a broad audience, and, in addition, their applications to signal processing are kept at an elementary level. The book begins with an introduction to vector spaces, inner product spaces, and other preliminary topics in analysis. Subsequent chapters feature: The development of a Fourier series, Fourier transform, and discrete Fourier analysis Improved sections devoted to continuous wavelets and two-dimensional wavelets The analysis of Haar, Shannon, and linear spline wavelets The general theory of multi-resolution analysis Updated MATLAB code and expanded applications to signal processing The construction, smoothness, and computation of Daubechies' wavelets Advanced topics such as wavelets in higher dimensions, decomposition and reconstruction, and wavelet transform Applications to signal processing are provided throughout the book, most involving the filtering and compression of signals from audio or video. Some of these applications are presented first in the context of Fourier analysis and are later explored in the chapters on wavelets. New exercises introduce additional applications, and complete proofs accompany the discussion of each presented theory. Extensive appendices outline more advanced proofs and partial solutions to exercises as well as updated MATLAB routines that supplement the presented examples. A First Course in Wavelets with Fourier Analysis, Second Edition is an excellent book for courses in mathematics and engineering at the upper-undergraduate and graduate levels. It is also a valuable resource for mathematicians, signal processing engineers, and scientists who wish to learn about wavelet theory and Fourier analysis on an elementary level.

At the intersection of mathematics, engineering, and computer science sits the thriving field of compressive sensing. Based on the premise that data acquisition and compression can be performed simultaneously, compressive sensing finds applications in imaging, signal processing, and many other domains. In the areas of applied mathematics, electrical engineering, and theoretical computer science, an explosion of research activity has already followed the theoretical results that highlighted the efficiency of the basic principles. The elegant ideas behind these principles are also of independent interest to pure mathematicians. A Mathematical Introduction to Compressive Sensing gives a detailed account of the core theory upon which the field is build. With only moderate prerequisites, it is an excellent textbook for graduate courses in mathematics, engineering, and computer science. It also serves as a reliable resource for practitioners and researchers in these disciplines who want to acquire a careful understanding of the subject. A Mathematical Introduction to Compressive Sensing uses a mathematical perspective to present the core of the theory underlying compressive sensing.

This is the first volume of a collection of original and review articles on recent advances and new directions in a multifaceted and interconnected area of mathematics and its applications. It encompasses many topics in theoretical developments in operator theory and its diverse applications in applied mathematics, physics, engineering, and other disciplines. The purpose is to bring in one volume many important original results of cutting edge research as well as authoritative review of recent achievements, challenges, and future directions in the area of operator theory and its applications.

A healthy ocean is home to many different kinds of animals. They can be big, like a whale, tiny, like a shrimp, and even scary, like a shark. Even though sharks can be scary, we need them to keep the oceans healthy. Unfortunately, due to overfishing, many shark species are in danger of extinction, and that can cause big problems in the oceans and even on land. What would happen if this continued and sharks disappeared completely? Artist Lily Williams explores how the disappearance would affect other animals across the whole planet in this clever book about the importance of keeping sharks, and our oceans, healthy.

This book focuses on tools and techniques for building regression models using real-world data and assessing their validity. A key theme throughout the book is that it makes sense to base inferences or conclusions only on valid models. Plots are shown to be an important tool for both building regression models and assessing their validity. We shall see that deciding what to plot and how each plot should be interpreted will be a major challenge. In order to overcome this challenge we shall need to understand the mathematical properties of the fitted regression models and associated diagnostic procedures. As such this will be an area of focus throughout the book. In particular, we shall carefully study the properties of resi- als in order to understand when patterns in residual plots provide direct information about model misspecification and when they do not. The regression output and plots that appear throughout the book have been gen- ated using R. The output from R that appears in this book has been edited in minor ways. On the book web site you will find the R code used in each example in the text.

Useful Concepts and Results at the Heart of Linear AlgebraA one- or two-semester course for a wide variety of students at the sophomore/junior undergraduate levelA Modern Introduction to Linear Algebra provides a rigorous yet accessible matrix-oriented introduction to the essential concepts of linear algebra. Concrete, easy-to-understand examples m

Based on the author's university lecture courses, this book presents the many facets of one of the most important open problems in operator algebra theory. Central to this book is the proof of the equivalence of the various forms of the problem, including forms involving C*-algebra tensor products and free groups, ultraproducts of von Neumann algebras, and quantum information theory. The reader is guided through a number of results (some of them previously unpublished) revolving around tensor products of C*-algebras and operator spaces, which are reminiscent of Grothendieck's famous Banach space theory work. The detailed style of the book and the inclusion of background information make it easily accessible for beginning researchers, Ph.D. students, and non-specialists alike.

A ``quantum graph'' is a graph considered as a one-dimensional complex and equipped with a differential operator (``Hamiltonian''). Quantum graphs arise naturally as simplified models in mathematics, physics, chemistry, and engineering when one considers propagation of waves of various nature through a quasi-one-dimensional (e.g., ``meso-'' or ``nano-scale'') system that looks like a thin neighborhood of a graph. Works that currently would be classified as discussing quantum graphs have been appearing since at least the 1930s, and since then, quantum graphs techniques have been applied successfully in various areas of

mathematical physics, mathematics in general and its applications. One can mention, for instance, dynamical systems theory, control theory, quantum chaos, Anderson localization, microelectronics, photonic crystals, physical chemistry, nano-sciences, superconductivity theory, etc. Quantum graphs present many non-trivial mathematical challenges, which makes them dear to a mathematician's heart. Work on quantum graphs has brought together tools and intuition coming from graph theory, combinatorics, mathematical physics, PDEs, and spectral theory. This book provides a comprehensive introduction to the topic, collecting the main notions and techniques. It also contains a survey of the current state of the quantum graph research and applications.
Over 400 descriptions of statistical computer programs are described in one easy-to-use volume. Written in a user-friendly manner, this reference includes author and key word indices for easy accessibility.
Frames for Undergraduates is an undergraduate-level introduction to the theory of frames in a Hilbert space. This book can serve as a text for a special-topics course in frame theory, but it could also be used to teach a second semester of linear algebra, using frames as an application of the theoretical concepts. It can also provide a complete and helpful resource for students doing undergraduate research projects using frames. The early chapters contain the topics from linear algebra that students need to know in order to read the rest of the book. The later chapters are devoted to advanced topics, which allow students with more experience to study more intricate types of frames. Toward that end, a Student Presentation section gives detailed proofs of fairly technical results with the intention that a student could work out these proofs independently and prepare a presentation to a class or research group. The authors have also presented some stories in the Anecdotes section about how this material has motivated and influenced their students.
The primary goal of this 2003 book is to give a brief introduction to the main ideas of algebraic and geometric invariant theory. It assumes only a minimal background in algebraic geometry, algebra and representation theory. Topics covered include the symbolic method for computation of invariants on the space of homogeneous forms, the problem of finite-generatedness of the algebra of invariants, the theory of covariants and constructions of categorical and geometric quotients. Throughout, the emphasis is on concrete examples which originate in classical algebraic geometry. Based on lectures given at University of Michigan, Harvard University and Seoul National University, the book is written in an accessible style and contains many examples and exercises. A novel feature of the book is a discussion of possible linearizations of actions and the variation of quotients under the change of linearization. Also includes the construction of toric varieties as torus quotients of affine spaces.
This book surveys the main mathematical ideas and techniques behind some well-established imaging modalities such as X-ray CT and emission tomography, as well as a variety of newly developing coupled-physics or hybrid techniques, including thermoacoustic tomography. The Radon Transform and Medical Imaging emphasizes mathematical techniques and ideas arising across the spectrum of medical imaging modalities and explains important concepts concerning inversion, stability, incomplete data effects, the role of interior information, and other issues critical to all medical imaging methods. For nonexperts, the author provides appendices that cover background information on notation, Fourier analysis, geometric rays, and linear operators. The vast bibliography, with over 825 entries, directs readers to a wide array of additional information sources on medical imaging for further study.
An examination of progress in mathematical control theory applications. It provides analyses of the influence and relationship of nonlinear partial differential equations to control systems and contains state-of-the-art reviews, including presentations from a conference co-sponsored by the National Science Foundation, the Institute of Mathematics and its Applications, the University of Minnesota, and Texas A&M University.
Holt's Linear Algebra with Applications, Second Edition, blends computational and conceptual topics throughout to prepare students for the rigors of conceptual thinking in an abstract setting. The early treatment of conceptual topics in the context of Euclidean space gives students more time, and a familiar setting, in which to absorb them. This organization also makes it possible to treat eigenvalues and eigenvectors earlier than in most texts. Abstract vector spaces are introduced later, once students have developed a solid conceptual foundation. Concepts and topics are frequently accompanied by applications to provide context and motivation. Because many students learn by example, Linear Algebra with Applications provides a large number of representative examples, over and above those used to introduce topics. The text also has over 2500 exercises, covering computational and conceptual topics over a range of difficulty levels.
It is the organization and presentation of the material, however, which make the peculiar appeal of the book. This is no mere compendium of results--the subject has been completely reworked and the proofs recast with the skill and elegance which come only from years of devotion. --Bulletin of the American Mathematical Society The very clear and simple presentation gives the reader easy access to the more difficult parts of the theory. --Jahrbuch uber die Fortschritte der Mathematik In 1937, the theory of matrices was seventy-five years old. However, many results had only recently evolved from special cases to true general theorems. With the publication of his Colloquium Lectures, Wedderburn provided one of the first great syntheses of the subject. Much of the material in the early chapters is now familiar from textbooks on linear algebra. Wedderburn discusses topics such as vectors, bases, adjoints, eigenvalues and the characteristic polynomials, up to and including the properties of Hermitian and orthogonal matrices. Later chapters bring in special results on commuting families of matrices, functions of matrices--including elements of the differential and integral calculus sometimes known as matrix analysis, and transformations of bilinear forms. The final chapter treats associative algebras, culminating with the well-known Wedderburn-Artin theorem that simple algebras are necessarily isomorphic to matrix algebras. Wedderburn ends with an appendix of historical notes on the development of the theory of matrices, and a bibliography that emphasizes the history of the subject.
To Volume 1 This work represents our effort to present the basic concepts of vector and tensor analysis. Volume 1 begins with a brief discussion of algebraic structures followed by a rather detailed discussion of the algebra of vectors and tensors. Volume 2 begins with a discussion of Euclidean manifolds, which leads to a development of the analytical and geometrical aspects of vector and tensor fields. We have not included a discussion of general differentiable manifolds. However, we have included a chapter on vector and tensor fields defined on hypersurfaces in a Euclidean manifold. In preparing this two-volume work, our intention was to present to engineering and science students a modern introduction to vectors and tensors. Traditional courses on applied mathematics have emphasized problem-solving techniques rather than the systematic development of concepts. As a result, it is possible for such courses to become terminal mathematics courses rather than courses which equip the student to develop his or her understanding further.
This self-contained graduate-level text introduces classical continuum models within a modern framework. Its numerous exercises

illustrate the governing principles, linearizations, and other approximations that constitute classical continuum models. Starting with an overview of one-dimensional continuum mechanics, the text advances to examinations of the kinematics of motion, the governing equations of balance, and the entropy inequality for a continuum. The main portion of the book involves models of material behavior and presents complete formulations of various general continuum models. The final chapter contains an introductory discussion of materials with internal state variables. Two substantial appendixes cover all of the mathematical background necessary to understand the text as well as results of representation theorems. Suitable for independent study, this volume features 280 exercises and 170 references.

An introductory textbook on the differential geometry of curves and surfaces in 3-dimensional Euclidean space, presented in its simplest, most essential form. With problems and solutions. Includes 99 illustrations.

Paul Richard Halmos, who lived a life of unbounded devotion to mathematics and to the mathematical community, died at the age of 90 on October 2, 2006. This volume is a memorial to Paul by operator theorists he inspired. Paul’sinitial research,beginning with his 1938Ph.D. thesis at the University of Illinois under Joseph Doob, was in probability, ergodic theory, and measure theory. A shift occurred in the 1950s when Paul’s interest in foundations led him to invent a subject he termed algebraic logic, resulting in a succession of papers on that subject appearing between 1954 and 1961, and the book Algebraic Logic, published in 1962. Paul’s ?rst two papers in pure operator theory appeared in 1950. After 1960 Paul’s research focused on Hilbert space operators, a subject he viewed as enc- passing ?nite-dimensional linear algebra. Beyond his research, Paul contributed to mathematics and to its community in manifold ways: as a renowned expositor, as an innovative teacher, as a tireless editor, and through unstinting service to the American Mathematical Society and to the Mathematical Association of America. Much of Paul’s in?uence ?owed at a personal level. Paul had a genuine, uncalculating interest in people; he developed an enormous number of friendships over the years, both with mathematicians and with nonmathematicians. Many of his mathematical friends, including the editors ofthisvolume,whileabsorbingabundantquantitiesofmathematicsatPaul’sknee, learned from his advice and his example what it means to be a mathematician.